

APPENDIX A

ARCHITECTURAL DESCRIPTIONS AND RECOMMENDED TREATMENTS FOR THE HONEYWELL COMPLEX ON BOCA CHITA KEY

Except for the Fowey Rocks Lighthouse, which is not owned by the National Park Service, all surviving architectural resources in Biscayne National Park are located on Boca Chita Key. Foundations, cisterns, modified landforms, shipwrecks, and prehistoric sites exist in and around other keys in the park; however, none of these are historic architectural resources.

Mark C. Honeywell owned Boca Chita Key from 1937 to 1945 and probably built his vacation retreat between 1937 and 1940. No documents have been found verifying the dates of construction or the designer of the structures. Jim Church, a junior draftsman in the architectural firm of August Geiger, prepared the blueprints for the lighthouse and named Leon Angle Camp and Jack Hunt as the designer and contractor, respectively. Because of similarities of design and construction, it is believed that the Geiger firm also designed the other structures on the island. The firm's principal, August Geiger, was a prominent architect in the Miami area, practicing from 1905 until the late 1940s. His significance as an architect is discussed in appendix B.¹

The Honeywell complex is located on the north end of Boca Chita Key. This end of the key is man-made, composed of fill material atop the original limestone. The fill is twelve to thirteen feet deep on either side of the mouth of the harbor, becoming shallower to the east and southeast. The fill is only a little more than five feet deep near the eastern shore of the island near the garage building.²

Ail of the buildings on Boca Chita were constructed with exterior walls of Miami oolitic limestone.³ Miami oolite has been used as a building material in South Florida since the mid-nineteenth century. The typical use is as rubble masonry, quarry-faced and unfinished, as found on Boca Chita. Less frequently the oolite is used for decorative highlights, as around the lighthouse door.⁴

The stone in the buildings on Boca Chita is likely to have problems similar to those exhibited by the coquina at Castillo de San Marcos in St. Augustine. The stones are of a similar age and

¹Geiger also designed the Honeywells' Miami Beach home and a studio for their estate in Indiana. *Florida Architecture and Allied Arts* (Miami, Fla.: Florida Architecture and Allied Arts, 1939); *Florida Architecture and Allied Arts* (Miami, Fla.: Florida Architecture and Allied Arts, 1941).

²KBC Consultants, Inc., "Report of GeoTechnical Consulting Services" (November 10, 1993).

³Not to be confused with Key Largo limestone, which is also known as 'keystone' or 'coral rock.'

⁴Metropolitan Dade County Office of Community and Economic Development, Historic Preservation Division, *From Wilderness to Metropolis: The History and Architecture of Dade County, Florida, 1825-1940*, (Miami, Fla.: Metropolitan Dade County, 1982), 164.

chemical make-up, but the stone on Boca Chita has been exposed to weathering for a shorter period of time. Design differences should result in fewer problems at Boca Chita because the buildings have fewer horizontal surfaces for rain and ocean spray to penetrate.

The structures on Boca Chita Key have proven sturdy in the decades following their construction. Thirteen hurricanes have blown through Dade County since 1939. During at least four of these storms the eye passed over Boca Chita Key. The buildings weathered their first test in 1941 when the eye of a hurricane passed just to the south of Miami, with winds measured at 123 miles per hour at Dinner Key. Sailing Baruch, who owned Boca Chita from 1950 to 1953, recorded that he had ridden out a hurricane in the lighthouse. This was probably Hurricane King, a category 3 storm which passed over Boca Chita in 1950. The most recent experience was Hurricane Andrew, which swept over the island in 1992. Andrew's gusts reached a speed of 169 miles per hour at nearby Fowey Rocks Lighthouse.⁵ The stone structures on Boca Chita have withstood the winds and the storm surges well, incurring little damage except to roofs, windows, and minor structural features.

Architectural descriptions of contributing and noncontributing properties within the Boca Chita Key Historic District follow. The descriptions, as well as the attached list of problems and recommended treatments, are based on the survey of the site in August 1995 by David Cullison. The Park has since completed restoration work on a number of the historic structures on Boca Chita; however, these changes are not reflected in this appendix.

Contributing Properties

Boca Chita Lighthouse (LCS 90190; HS-1): Honeywell reportedly built the lighthouse on Boca Chita as a beacon to guide himself and his guests to the island. A popular story reports that the United States Coast Guard ordered it shut down after its first lighting in the late 1930s because it was not a registered and approved navigational aid. However, the floor of the lantern at the top of the tower has no attachments for affixing a light and appears never to have had any, casting doubt on the story.

The core of the tower is open, with the concrete bricks forming a shell around the open center with its spiral staircase. Oolite is laid on the outside of the concrete. The exterior of the building is of rubble masonry construction, using Miami oolitic limestone. The lower section of the tower is constructed as a plinth, which is wider than the upper sections. The base of the tower measures just under 21 feet in diameter. The plinth is topped by a water table, a rounded course of limestone that both merges the projecting plinth with the set-back upper section of the

⁵Ivan Ray Tannehill, *Hurricanes: Their Nature and History—Particularly Those of the West Indies and the Southern Coasts of the United States* (Princeton, N.J.: Princeton University Press, 1952), 227; Nicholas N. Patricios, *Building Marvelous Miami* (Gainesville, Fla.: University Press of Florida, 1994), 278-79; Yelen, 3; National Hurricane Conference, *Lessons of Hurricane Andrew, Excerpts from the 15th Annual National Hurricane Conference, April 13-16, 1993, at Twin Towers Hotel, Orlando, Florida*, comp. by Lawrence S. Tait (Tallahassee, Fla.: Federal Emergency Management Agency, 1993), 15.

wall and acts as a coping for the plinth. Above this course the wall tapers upward to the reinforced concrete deck, which serves as the floor of the gallery and the top floor beneath the lantern. The lantern is a dome-shaped steel frame, originally set with glass lights, and topped by a small metal finial. The frame rises directly from the floor, and consists of four pieces bolted together. After Hurricane Andrew the dome was removed, sandblasted, and repainted. The dome construction is similar to that of the Alhambra Water Tower (1926) in nearby Coral Gables.

A steel ladder provides access to the lantern through a rectangular hole in the floor, currently covered by a wooden hatch. A simple painted steel balustrade encloses the gallery. Small, deeply inset, rectangular window openings pierce the column of the tower. Several openings still hold the wooden casements that formed the original windows; in other cases only elements of the steel hardware remain. In all cases the glass is missing.

A circular staircase occupies the interior of the tower; the stairs are cantilevered, allowing the center to remain open. The balustrade is the same type as that enclosing the gallery. A reinforced concrete intermediary floor is set between the ground and the gallery level.

The front doorway has smooth stone surrounds projecting slightly from the walls. The door is a simple batten pattern. Three stone steps lead to the doorway, which is deeply set between walls of polished, coursed ashlar blocks of oolitic limestone. A single large slab of shaped stone spans the entry.

The tower is reported to stand atop a cistern. The foundations appear well constructed; the tower has stood on 13 feet of relatively loose fill since 1939. The foot of the tower is set on a terrace-like base paved with the same stone used in the body of the tower. This terrace is square, 28 feet on each side, with chamfered comers. Each comer holds two low piers connected by curving stone walls. Each of the three sides away from the front entrance has a heavy steel or iron chain stretched across it, with the ends secured in the flanking piers. The tops of the piers and low walls are coped with a thin layer of concrete.

The lighthouse is a modest representation of the Streamline Moderne style. The curves of the upper concrete gallery deck and the dome are typical of this style, as are the swirling interior stairs and the curves of the entry steps and roof. Both the Streamline Moderne style and its antecedent, the Art Deco, were popular in the Miami area in the 1920s and 1930s.

Problems and Recommended Treatments—In 1992, Hurricane Andrew destroyed all the glass in the tower as well as some of the wooden casement frames. The Honeywell Foundation of Wabash, Indiana, is underwriting the replacement of the glass in the lantern. The missing casements should be replaced with similar wooden windows. The surviving frames should be repainted and missing elements replaced. The front door needs to be repainted and any missing elements replaced.

The major potential problem with the lighthouse is a vertical crack running down the front of the tower (east face) from the base of the concrete collar at the gallery level nearly to the top of the door frame. Photographs taken in 1992 show that the crack predates Hurricane Andrew. The cause of the crack cannot be determined without further study. The most common cause of

cracks in masonry walls is differential settlement; however, the placement of this crack seems to rule out settlement as the cause. The most likely cause of the crack appears to be stress from the uneven distribution of the weight of the concrete at the top of the tower. Another possibility is stress caused by the high winds associated with the several hurricanes that have struck Boca Chita since the tower was built. This possibility seems less likely because of the apparent lack of structural damage by Hurricane Andrew in 1992, however.

A structural engineering consultant's advice should be sought to identify the cause of the damage and determine whether the crack has stabilized.⁶ If the crack is still active, then the stress on the masonry must be alleviated. Otherwise, portions of the facade may eventually collapse. If the crack has stabilized (i.e., the crack itself has relieved the structural stress), then only relatively simple repairs will be necessary. The stones around the crack will need to be examined to assure that they remain bonded to the rest of the facade, and the crack will need to be sealed with a mortar that has been matched to the original material. The purpose of the crack sealing is two-fold: to prevent water penetration and accompanying deterioration of the surrounding stonework, and to cosmetically blend the crack into the rest of the facade.

A less threatening problem is the deterioration of stone at the water table, the course topping the plinth near the bottom of the lighthouse. Close examination of the stone shows that the curved surface here is slowly dissolving, likely because of rainwater abetted by blowing salt spray. Acid rain will speed this process, but even pure water can dissolve limestone given enough time. Water runs quickly down the nearly vertical sides of the upper tower, but slows as this course of stone curves to approach the horizontal. The flow speed increases again below this course, down the vertical walls of the lower tower. This type of problem has been identified in the past in other structures built of oolitic limestone.⁷

The most likely method to prevent continued erosion is to seal the stone, allowing the water to flow past without penetrating and dissolving the material. The easiest method of sealing the stone would be to apply a layer of concrete over the stones in this course; however, this method would compromise the design integrity of the lighthouse. Chemical methods of sealing stone are available, but all are controversial. The best immediate response appears to be to simply monitor the situation. The deteriorating stone should be measured to establish a baseline, and further measurements taken at regular intervals to determine the speed of deterioration. If damage continues too rapidly, repairs would be necessary to preserve the long-term integrity of the facade. If the erosion is slow, the park may want to allow time for better products to reach the market. In the long run, the stones in this course may eventually need to be replaced.

⁶A simple test to determine whether the crack has stabilized is to place a patch of plaster across the crack and to observe the patch for several months.

⁷See Wilson G. Martin, "Oolitic Limestone Conservation: A Case Study in Conservation and Maintenance, Governor's Mansion, Salt Lake City, Utah," *APT Bulletin* XVII, 2 (1985): 25, 27.

The paving stones of the terrace are also dissolving, probably for the same reasons as the stones of the water table. The treatment considerations are the same, except that use of concrete, or any paving material other than the current stones, would greatly change the look of the building and detract from its integrity.

The chains strung between the piers around the terrace are also deteriorating. The damage thus far is minimal, but corrosion can be expected to continue unless protective measures are taken. The recommended treatment is to seal the metal away from the salt air. The simplest method of protecting the chains is to remove all rust and then paint them, preferably a dull black color to simulate their natural state. As with any painted surface, this will need to be renewed periodically.

Boca Chita Chapel (IDLES 90191; HS-2): The chapel is a small (12 feet by 20 feet) building constructed of concrete block faced with uncoursed Miami oolitic limestone. The most eye-catching feature is the unusual steeply pitched, concave roof. The building has two openings in each wall, symmetrically arranged, with doorways on the north and east walls. All of these openings were boarded over with plywood at the time of the site visit; prior to Hurricane Andrew the windows held double-hung sash. The window- and doorsills are of concrete. A low wall curves out from the southeast corner of the building to flank one of the entry doors. New fiberglass/asphalt shingles cover the roof, replacing a similar covering destroyed in the 1992 hurricane.

Problems and Recommended Treatments—Hurricane Andrew removed the roof, damaged the roof framing, and damaged the windows and doors on the building. The park has already repaired the roof framing and replaced the asphalt shingle roof; however, the windows and doors have not been replaced. All windows and doors should be replaced in kind.

The stonework below some of the windows is stained, probably by ferrous oxide leaching from the concrete sill. This is a common problem when portland cement is close to limestone, marble, and some sandstones. The preferred method of cleaning is to use a treated poultice (a description of this procedure is included in appendix C). The staining will reoccur, but cleaning every few decades should be more cost-effective than replacing the concrete sills. However, if replacement becomes necessary, a nonstaining portland cement should be used.

Boca Chita Picnic Pavilion (IDLCS 90192; HS-3): Ten squared oolitic limestone piers rise from a 15-foot-by-52-foot concrete slab base. The piers probably are constructed around either a steel or a reinforced concrete core. They are aligned in two parallel rows, creating a structure four bays long and one bay wide. A simple, classical cornice and frieze separate the piers from the hipped roof. The cornice was partially repaired after Hurricane Andrew. New fiberglass/asphalt shingles replace similar material destroyed in the hurricane. Unusual metal tie-bars help hold the two sides of the structure together. Both the tie-bars and the roof framing are visible inside the pavilion.

Problems and Recommended Treatments- Prior to Hurricane Andrew, a frame addition stood at the north end of the pavilion, and the pavilion was screened. Both of these features were destroyed in the storm, and the park does not intend to replace them. The park has repaired the damage to the roof and cornice caused by Hurricane Andrew, and the structure appears to be in good condition.

Boca Chita Garage (IDLCS 90193; HS-4): Also known as the barn or maintenance building, this concrete block structure has a reinforced concrete frame and an exterior of uncoursed oolitic limestone. The structure rests on a concrete slab foundation and measures 71 feet by 31 feet. New fiberglass/asphalt shingles cover the steel roof trusses. The rectangular solidity of the building, along with its gabled roof and the low chimneys rising at each end, give the impression of a Colonial residence. The barn has no stylistic details. The north side has four large garage door openings; the fifth bay is occupied by a standard-size door. A transom is set below the eaves above each of the larger doors. The rear (south) facade has five windows, each with a transom above. Two smaller windows are set in the upper wall on the west ends. All window- and doorsills are concrete. At the time of the survey all windows and three of the large doors were boarded with plywood. A new garage-type door had been installed in the fourth bay.

Problems and Recommended Treatments- Hurricane Andrew removed the roof, damaged portions of the roof framing and the upper walls, and damaged or destroyed all the windows and doors. The roof and walls have been repaired, but only one of the doors has been replaced. The remaining doors and windows should be replaced with materials similar to the originals. The modern garage door that has been installed should also be replaced with one that *more* closely resembles the original.

As in the chapel, the walls are stained beneath the concrete sills. Cleaning poultices as described in appendix C should remove the stains.

Boca Chita Engine House and Cistern (IDLCS 90194; HS-5): Also known as the generator building, this concrete block structure with concrete slab foundation measures 15½ feet by 32½ feet. The rear third of the structure is built of a different type of concrete block than the front, although no corresponding variation can be discerned on the exterior. The exterior walls are of uncoursed oolitic limestone. The front-gabled roof has been re-covered with asphalt/fiberglass shingles, replacing the old roof damaged by Hurricane Andrew. The narrow building front has a door and window. The door appears to be original. The rear wall has no openings. Originally, the rear was gabled, but it is now hipped as a result of repairs undertaken after Hurricane Andrew. An octagonal concrete cistern, 15 feet on each side, is attached to the rear (east) of the building. A shed porch on the south side of the building was demolished by the hurricane and will not be rebuilt.

Problems and Recommended Treatments- At the time of the site visit the windows were covered with plywood. The original windows should be repaired or replaced to match the originals. Staining beneath the windows should be poulticed.

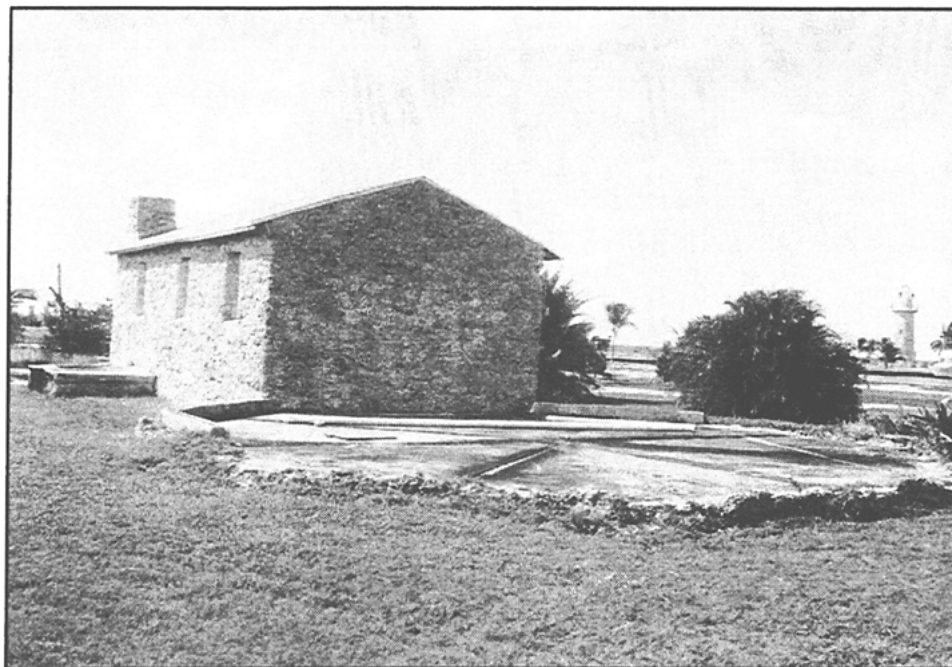


Figure A- 1. Engine House, 1997

Boca Chita Bridge (IDLCS 90195; HS-6): A simple arched concrete bridge spans a small, bulkheaded canal. The bridge is 14 feet long and 6 feet wide. The deck and the arched reinforcements on either side below the deck are of reinforced concrete, while the 3-foot-high walls are of uncoursed oolitic limestone. Each of the walls originally flared out into low scroll forms at either end. Hurricane Andrew removed about two-thirds of the south wall of the bridge.

Problems and Recommended Treatments– Most of the concrete sheathing on the bottom of the bridge deck has pulled free and has fallen from the bridge, exposing the corroded reinforcement and forming cracks in the upper surface of the deck. The reinforcing bars in the ribs beneath either side of the deck are also exposed. Photographs taken in 1992 prior to the hurricane show the exposed rebars in the ribs. It is likely that the reinforcement under the deck had begun to decay before the storm and that the surf and storm surge dislodged the loose concrete. Although the original corrosion might be due to seawater contamination of the original cement mixture, it is more likely that the corrosion is the result of salt infiltration due to long-term exposure to seawater. The concrete survived a long time before showing the corrosion, and nothing similar has been found in any of the other buildings constructed at the same time.

An engineer experienced with both historic structures and marine conditions should be consulted. The most thorough method of repair in this situation is to expose and clean the metal reinforcements within the bridge and to protect them from future corrosion before fresh concrete

is applied. Care should be taken to add new, rust-proof reinforcements to guarantee the bond between the new concrete and the old. Other methods are sometimes useful and may be recommended by a consulting engineer. Plans for the canal under the bridge will also impact the choice of reinforcement material for the bridge.

At the time of the site visit the new bulkhead being installed in the harbor blocked off the canal from the sea. Removal of the water from under the bridge alters the historic function and use of the structure and damages its integrity. On the other hand, blocking the canal has the benefit of preventing direct contact between seawater and the bridge, eliminating the need for waterproof reinforcement.

The bridge wall should be rebuilt to replicate the historic work. The original material may be recoverable from the canal under the bridge. If the stones have not been damaged by their immersion, they should be re-used. If the original material is too deteriorated, matching stone may be used.

Boca Chita Stone Walls (IDLCS 90196; HS-7): The original complex included a stone wall around the primary structures in the original complex on Boca Chita. The wall was constructed of oolitic limestone on a concrete foundation, with steel reinforcing rods running at intervals vertically through the stonework, tying it to the foundation. Prior to Hurricane Andrew, the stone wall on Boca Chita ran southeast from the Biscayne Bay shore south of the picnic pavilion about 400 feet, curved tightly east for 35 feet, extended to the east for another 309 feet, then turned north for 155 feet, terminating near the engine house. Seven gateways passed through the original wall, but only three remain. Two of these are 10 feet wide and are flanked by tall gateposts. The third is only 4 feet wide and is topped by a small arch rising above the wall. The hurricane demolished the eastern two-thirds of the wall, excluding small segments, as well as a one-room stone gatehouse. The park plans to retain the ruins of the wall in place.

Problems and Recommended Treatments– The destruction of more than half of the wall by Hurricane Andrew presents two alternatives for its treatment: 1) to reconstruct the damaged wall sections, or 2) to allow the remains of the wall to remain in place, with no reconstruction. The park has chosen the second alternative, in part because reconstruction of the wall would be expensive. Removal of the rubble is not recommended because the ruins illustrate the original function of the wall to delineate between the developed and natural sections of the key.

Boca Chita Canal (IDLCS 91570; HS-8): The canal predates the bridge, appearing on a 1932 map of the area. It extends about 45 feet to the south beyond the bridge. The canal walls are uncoursed limestone topped by a concrete coping. The canal is rectangular in form; the stone retaining walls forming the canal enclose its south end, and the metal bulkhead installed in 1995 encloses the north end. The north end formerly was open to the harbor.

Problems and Recommended Treatments– The south end of the canal broke loose during the hurricane, possibly due to subsidence of the fill beneath it. This section may be repaired to its original condition using the displaced stones, but preservation of the integrity of the site does

not require this, especially if the canal is to remain dry. Cracks should be repaired with similar stones and a concrete coping should be installed to prevent the damage from expanding and to protect visitors.

The stones of the canal walls show obvious signs of deterioration from their immersion in seawater. The deterioration cannot be stopped if the stones continue to be exposed to the sea, but the rate of dissolution appears slow enough that the wall could stand for another twenty or thirty years. If the park chooses to maintain a dry canal, deterioration will be greatly decreased and perhaps eliminated.

Boca Chita Retaining Walls (IDLCS 91571; HS-9): Dry-laid stone retaining walls are found on the north side of the island.⁸ These walls are constructed of oolitic limestone. The retaining wall on the north is distributed along the side of the fill. Some of the stone has fallen away, and all has deteriorated to some extent. The wall appears weathered and thus has the natural look of stone shores on the seaward side of several of the other keys in the park.

Problems and Recommended Treatments— Repair of these walls is not necessary to maintain the historic integrity of the site. If the park decides to repair the walls, they should reinstall fallen stones rather than incorporating new material. If an insufficient number of fallen stones are found, matching material should be used. Spot infill of stones is preferred over mass replacement of the historic material.

Concrete Walkways (IDLCS 91616; HS-10): A concrete slab walkway extends from the harbor east to the main house foundations, then proceeds south to the engine house. A short walkway also extends northeast from the intersection with the modern boardwalk around to the rear of the house site. The walkway is continuous, except where it crosses the boardwalk at two separate points.

Problems and Recommended Treatments— The concrete walkways are in good condition; however, they are threatened by development at the site. The historic traffic patterns at the Honeywell complex should be preserved, and the park should consider using existing walkways in plans for future development of visitor facilities on the island.

Boca Chita Cannon: The cannon is cradled in a stone base with small depressions on either side to hold the gun's trunnions. The stone of the base is in good condition, but the cannon is badly corroded, with the outer layers exfoliating. The muzzle of the gun is open, allowing water to enter and, incidentally, providing a nest for a crab. This cannon apparently was cast in two

⁸Retaining walls also exist along both sides of the shallow drainage channel on the west side of the island; however, the walls are outside the Boca Chita Key Historic District boundary and little is known about their construction. A third stone retaining wall lines the short canal from the harbor, but it is different in character and has been discussed in the section dealing with the Boca Chita Bridge.

parts, with the inner section and outer of two different alloys. Where the inner material is exposed near the muzzle it does not appear corroded.

Problems and Recommended Treatments—

The surface of the cannon needs to be protected from both rain and saltwater. The surface will need to be prepared by the removal of rust, which in this case will be difficult because of the extent of the corrosion. Only manual methods should be used to remove the corrosion; a wire brush should probably be used, but chemical application might also be a possibility. The metal should then be stabilized by painting with primer and a black finish coat appropriate to the salt environment. The joints where metal rests against stone should

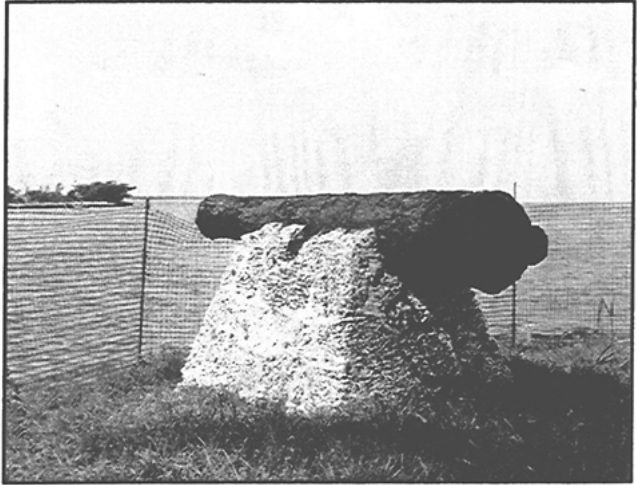


Figure A- 2. Cannon, 1995

be carefully examined for openings where water could pool against the gun or flow under it and the openings sealed. The mouth of the gun should be plugged to prevent water infiltration.

Noncontributing Properties

Boca Chita Bulkhead: A bulkhead is a vertical retaining wall constructed to hold fill in place and to prevent erosion by the sea. The original bulkhead on Boca Chita was reportedly constructed of wood in either the later 1910s or early 1920s. This wall was probably destroyed in a hurricane. Milton W. Harrison installed the first steel bulkhead on the island in the early 1930s. This structure remains, but the National Park Service installed a new steel bulkhead in 1995 between the water and the old bulkhead. The gap between the two was then filled with earth. The new bulkhead resembles the one it replaced, although it probably better resists the damaging effects of the marine environment. Bulkheads are present in the harbor, the northwest point of the island, and the west side of the island from the harbor to a point south of the stone wall.

Problems and Recommended Treatments— The older bulkhead has deteriorated in several places, primarily as a result of surface run-off. The areas of greatest corrosion and deterioration are at the heads of shallow erosion gullies. These gullies should be filled and the run-off problems solved to slow further deterioration of the steel.

Foundations of Main House— The concrete foundations of the main house exist within the historic district. They are located near the center of the district, east of the harbor, north of the engine house, west of the stone wall, and southeast of the chapel.

Shower house foundation– A concrete block and cement slab foundation measuring 12 feet by 6 feet marks the location of a shower house at the site of Grandma’s Hut. The foundation is located directly south of the main house ruins.

Boardwalk– The National Park Service constructed a wooden boardwalk on Boca Chita Key after Hurricane Andrew devastated the island in 1992. The boardwalk extends east from Boca Chita Harbor at two separate points, merging just south of the main house foundation ruins.

Other Comments on the Site

A concrete slab marks the site of the main house. This building predated the Honeywell tenure on the island but served as the primary housing for the Honeywells and subsequent owners until the 1960s, when it burned. A concrete sidewalk leads from the harbor to the house site. A limestone pavement runs along the old bulkhead in front of the main house site. The stones show signs of dissolution, apparently caused by water pooling on the stone. The park plans to build a raised walkway along the bulkhead which would cover this terrace, although it may not protect the surface from continued water damage.

Until recent years the Australian pine (*Casuarina equisetifolia*) was a very common tree on the island. This exotic was introduced into South Florida in the early twentieth century and was widely used in local landscaping. The park has established a program to remove the pine from all park property to limit its propagation and the destruction of native species. Although the Australian pine was probably used in the original landscaping of the site, the problems caused by the tree more than outweigh the value of its retention. All Australian pines appear to have been removed from Boca Chita, and some have been replaced by native plantings. The 1992 hurricane caused some damage to the new plantings and killed off the native mangrove swamp located in the center of the south side of the island. Research and anecdotal evidence show that damaged mangroves have grown back after earlier hurricanes.⁹

⁹See Peter Wayne Harlem, *Aerial Photographic Interpretation of the Historical Changes in Northern Biscayne Bay, Florida, 1925 to 1976*, Sea Grant Technical Bulletin No. 40 (Coral Gables, Fla.: University of Miami, 1979), 3, for mangrove destruction by the 1926 hurricane and subsequent regrowth. Also see R. Munroe, 187, for a brief description of the denuded Ragged Keys after the 1906 storm.